

# LIQUID CRYSTAL DISPLAY AND ITS ROTARY ASSEMBLY

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The invention relates to a liquid crystal display; in particular, a liquid crystal display with a simplified and miniaturized rotary assembly.

### 2. Description of the Related Art

As liquid crystal displays have recently been improved in low-voltage operation, low power consumption, and thickness, the displays are widely used as AV devices, OA devices, or household appliances as well as television receivers or monitors.

FIG. 1a and FIG. 1b show a conventional liquid crystal display 10. The liquid crystal display 10 comprises a displayer 11, a base 14, a support 15, and a rotary shaft 16.

The displayer 11 comprises a liquid crystal panel 111, a front bezel 112, and a rear frame 113. The rear frame 113 is connected to the support 15 via the rotary shaft 16. The support 15 is disposed on the base 14 in a rotatable manner.

As stated above, the displayer 11 is connected to the base 14 via the rotary shaft 16 and the support 15. Thus, the displayer 11 can rotate around an X axis and a Y axis as shown in FIG. 1a. However, the structure of the base 14, the support 15, and the rotary shaft 16 is complicated, and the assembly between these elements is also complicated. Thus, the manufactory process of the conventional liquid crystal display 10 is very complicated.

## SUMMARY OF THE INVENTION

In order to address the disadvantages of the aforementioned liquid crystal display, the invention provides a liquid crystal display with a simplified and miniaturized rotary assembly to simplify the manufactory process.

Another purpose of this invention is to provide a rotary assembly adapted for a liquid crystal display at a low cost.

Accordingly, the invention provides a liquid crystal display. The liquid crystal display comprises a displayer, a hinge, a first rotating member, a base, and a second rotating member. The hinge is connected to the displayer, and disposed on the first rotating member. The first rotating member is disposed on the base. The second rotating member is disposed on the base in a manner such that the second rotating member and the first rotating member rotate together.

In a preferred embodiment, the base includes a first concave portion for receiving the first rotating member.

Furthermore, the first rotating member includes a step portion located in the first concave portion, and the base includes a second concave portion for receiving the second rotating member, opposite to the first concave portion.

In another preferred embodiment, the second rotating member includes a cambered surface abutting on the base to linearly contacting with the base.

In another preferred embodiment, the liquid crystal display further comprises a bolt for connecting the first rotating member and the second rotating member so that the second rotating member and the first rotating member rotate together.

Furthermore, the base includes a hollow portion, the first rotating member includes a screw hole, and the second rotating member includes a through hole corresponding to

the screw hole, whereby the bolt is screwed to the screw hole through the through hole to combine the first rotating member and the second rotating member.

In another preferred embodiment, the base, the first rotating member, and the second rotating member are made of metal respectively.

In another preferred embodiment, this invention provides a rotary unit for a liquid crystal display, including a displayer and a hinge. The rotary unit comprises a base, a first rotating member, and a second rotating member. The first rotating member disposed in the base in a rotatable manner is connected to the displayer via the hinge. The second rotating member is disposed in the base in a manner such that the second rotating member and the first rotating member rotate together.

In another preferred embodiment, this invention provides a rotary assembly. The rotary assembly comprises a base, a first rotating member, a second rotating member, and a hinge. The first rotating member is disposed in the base in a rotatable manner. The second rotating member is disposed in the base in a manner such that the second rotating member and the first rotating member rotate together. The hinge is disposed on the first rotating member.

## BRIEF DESCRIPTION OF THE DRAWINGS

The invention is hereinafter described in detail with reference to the accompanying drawings in which:

FIG. 1a and FIG. 1b are schematic views of a conventional liquid crystal display;

FIG. 2a is an exploded view showing a rotary assembly as disclosed in this invention;

FIG. 2b is an exploded view showing a rotary unit as disclosed in this invention;

FIG. 2c is a schematic view showing the assembled rotary assembly in FIG. 2a;

FIG. 3a is a schematic view showing a base in FIG. 2a;

FIG. 3b is schematic view showing a first rotating member in FIG. 2a;

FIG. 3c is schematic view showing a second rotating member in FIG. 2a;

FIG. 4a is a schematic view showing a liquid crystal display as disclosed in this invention;

FIG. 4b is a schematic view showing a liquid crystal display as disclosed in this invention, with a second embodiment of a rotary assembly; and

FIG. 5 is a schematic view showing a liquid crystal display as disclosed in this invention, with a third embodiment of a rotary assembly.

## DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 2a and FIG. 2c, a rotary assembly 30, as disclosed in this invention, comprises a base 21, a first rotating member 22, a second rotating member 23, two bolts 24, and a hinge 31. The base 21, the first rotating member 22, the second rotating member 23, and the bolts 24 constitute a rotary unit 20 of this invention, as shown in FIG. 2b.

Referring to FIG. 3a, the base 21 includes a first concave portion 211, a second concave portion 212 (referring to FIG. 2b), and a hollow portion 213. The first concave portion 211 receives the first rotating member 22. The second concave portion 212 receives the second rotating member 23 as shown in FIG. 2b. The bolts 24 pass through the hollow portion 213. It is noted that the first concave portion 211 and

the second concave portion 212 are formed at opposite sides of the base 21.

As shown in FIG. 3b, the first rotating member 22 includes a step portion 222. The first rotating member 22 is disposed in the base 21 in a manner such that the step portion 222 is located in the first concave portion 211. Also, the first rotating member 22 is disposed in the base 21 in a rotatable manner. Referring to FIG. 2b, the step portion 222 is provided with two first screw holes 221 at a surface facing the base 21. The first screw holes 221 accept the bolts 24. It is noted that only one first screw hole 221 is shown in FIG. 2b. The first rotating member 22 is provided with a plurality of second screw holes 223 at a surface opposite to the step portion 222.

The hinge 31 may be selected from various types that are commercially available, and is disposed on the first rotating member 22. The hinge 31 is provided with a plurality of second through holes 311 and a plurality of third through holes 312. Referring to FIG. 2c, bolts 25 screw to the second screw holes 223 of the first rotating member 22 through the second through holes 311 of the hinge 31 so that the hinge 31 is disposed on the first rotating member 22.

Referring to FIG. 2b, the second rotating member 23 is disposed in the second concave portion 212 of the base 21. As shown in FIG. 3c, the second rotating member 23 includes a cambered surface 231 abutting on the base 21. By means of the cambered surface 231, the second rotating member 23 linearly contacts with the base 21. Thus, the second rotating member 23 rotates smoothly relative to the base 21. In addition, the second rotating member 23 is provided with two first through holes 232 corresponding to the first screw holes 221 of the first rotating member 22.

The bolts 24 are screwed to the first screw holes 221 of the first rotating member 22 through the first through holes 232 of the second rotating member 23 and the hollow portion 213 of the base 21 so that the second rotating member 23 is combined with the first rotating member 22 in a manner such that the second rotating member 23 and the first rotating member 22 rotate together.

It is noted that in this embodiment, the first rotating member 22 and the second rotating member 23 are combined together by the bolts, and the hinge 31 and the first rotating member 22 are combined together by the bolts. However, their combination manner is not limited. For example, they can be combined together by welding.

Furthermore, the base 21 is round in this embodiment; however, its shape is not limited. Based on variant conditions, the base 21' can be rectangular as shown in FIG. 4b. It is understood that the first concave portion and the second concave portion of the base 21' are still round to correspond to the first rotating member and the second rotating member.

In addition, the amount of the bolts, the screw holes, and the through holes is not limited as long as its function can be attained.

Referring to FIG. 4a, a liquid crystal display 100, as disclosed in this invention, comprises a displayer 40 and the rotary assembly 30 as stated above.

The displayer 40 is connected to the rotary assembly 30 via the hinge 31. Bolts 42 are screwed to the screw holes (not shown) of the displayer 40 through the third through holes 312 (referring to FIG. 2a) of the hinge 31 so that the hinge 31 is connected to the displayer 40. However, its connection manner is also not limited.

Since the rotary assembly 30 supports the displayer 40's weight, it must itself have a certain weight to prevent